

## **SPECIFICATION AMENDMENTS**

Significant parts are as follows:

- |       |   |                              |
|-------|---|------------------------------|
| 1     | x bracket   |                              |
| 2     | x, y bracket  |                              |
| 3     | y, theta bracket  |                              |
| 4     | yaw bracket   |                              |
| 5     | yaw vacuum diffuser bracket                             |                              |
| 6     | x preload spring bracket                                |                              |
| 7     | vacuum diffuser plate                                   |                              |
| 8     | yaw shaft   |                              |
| 10 9  | yaw preload spring assembly                             |                              |
| 10    | x preload spring assembly                               |                              |
| 11    | x adjustment screw assembly                             |                              |
| 12    | yaw adjustment screw                                    |                              |
| 13    | yaw adjustment screw assembly                           |                              |
| 14    | yaw vacuum diffuser plate support island                |                              |
| 15    | clamp   |                              |
| 16    | post  |                              |
| 17    | y preload spring  |                              |
| 18    | y preload spring bracket                                |                              |
| 20 19 | <u>high-resolution stage</u>                            |                              |
| 20    | <u>central yaw shaft opening</u>                        |                              |
| 21    | <u>high-resolution stage surface</u>                    |                              |
| 22    | <u>yaw shaft opening</u>                                |                              |
| 23    | <u>vacuum channel pattern</u>                           |                              |
| 24    | <u>epoxy cement</u>                                     |                              |
| 25    | <u>peripheral vacuum diffuser plate locating relief</u> |                              |
| 26    | <u>slideway</u>   | 27 <u>vacuum channel</u>     |
| 28    | <u>x adjustment screw</u>                               | 29 <u>y adjustment screw</u> |

## Operation

The x bracket 1 may be considered the base for discussion of alignment motions. All other portions of the substrate chuck are movable with respect to the x bracket 1. Prior to start of the fine alignment procedure, the system has positioned a panel on the substrate chuck, where it is held in place by vacuum on vacuum diffuser plate 7. Vacuum is distributed to vacuum diffuser plate 7 through yaw vacuum diffuser bracket 5 to vacuum diffuser plate support islands 14. Figs. 1, 2 & 3 show the mounting of yaw vacuum diffuser bracket 5 rotatably about yaw shaft 8.

- 10 Yaw adjustment screw 12 provides manual adjustment (theta) for yaw, moving the y, theta bracket 3 rotationally in the small increment required for theta adjustment of yaw vacuum diffuser bracket 5. Note that adjustments in theta, x and y are controlled respectively by theta, x and y adjustment screws, respectively numbered 12, 28 and 29, counteracted by preload springs. Two x preload springs 10 and two y preload springs 17 appear in Fig. 4. Assembly items such as clamp 15 and post 16 in Figs. 1 and 3 hold parts in place generally, while allowing the small sliding motions of adjustment, and may be accessed from above through reliefs in overlying planes.

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First, the operator moves the x, y bracket 2, using the x adjustment screw 28 in the x adjustment assembly 11. Next the operator moves the y, theta bracket 3, using the yaw adjustment screw 12 in the yaw bracket 4. adjustment screw assembly 13. Last, the operator moves the y, theta bracket 3 in slideway 26, using the y adjustment screw 29 in the y adjustment assembly 13. Adjustment screws work against related preload springs such as y preload spring 17 (Fig. 4), which is held by y preload

spring bracket 18. It may be necessary to repeat one or more adjustments to reach final adjustment.

After completing the alignment process, the operator may cause the panel to be imaged ~~imaged~~ or otherwise acted upon, and subsequently to access and align another panel.

The yaw shaft 8 is supported by x bracket 1, and permits other elements to rotate for yaw adjustment. Yaw preload spring assembly 9 holds vacuum diffuser plate 7 up -- and holds y, theta bracket 3 down. The spring configuration is not critical, so long as it provides spacing and power  
10 sufficient to carry out its support function for vacuum diffuser plate  
7.

Step 1        dispensing a bead of epoxy cement 24 in the peripheral vacuum diffuser plate locating relief channel and dispensing beads of epoxy cement 24 on the vacuum diffuser plate support islands 14;

Step 2        placing a diffuser plate within said peripheral vacuum diffuser plate locating relief channel of said diffuser plate support with sufficient force to deform said beads of epoxy cement so as to make a pre-assembly with the surface of the diffuser plate and top plane non-co-planar;

Step 3        flipping the pre-assembly over onto a high-flatness rigid  
10 surface plate;

Step 4        shaking the pre-assembly, to co-planar juxtaposition of the vacuum diffuser plate 7 and top plane of the yaw vacuum diffuser \* bracket 5; and

Step 5        letting the epoxy cement 24 cure.